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EXAMINER

ONEILL, KARIE AMBER

ART UNIT PAPER NUMBER

1745

DATE MAILED: 07/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/713,359

Applicant(s)

LAZAROFF, DENNIS

Examiner

Karie O'Neill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 30-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Group I, Claims 1-29, in the reply filed on June 13, 2006, is acknowledged. Claims 30-39 are withdrawn from consideration.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-4, 6-10, 12-14, and 16-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Mardilovich et al. (US 2004/0081878 A1).

With regard to Claims 1-2, Mardilovich et al. discloses in Figures 1A, 1B, a dual chamber fuel cell element (10), comprising: a dual chamber fuel cell stack layer (paragraph 0051) comprising an anode (16), cathode (18) and electrolyte materials (14) deposited on one side of a substrate (70) as can be seen in Figure 8, and wherein one or more separated flow passageways formed between the stack and the substrate through the process of a conductive member (20') covering the substrate (70) being partially or fully

removed to form passageways to expose electrodes to oxidants/reactants (paragraph 0094).

With regard to Claims 3-4, Mardilovich et al. discloses in paragraphs 0056-0059, the element of Claim 1 above, wherein the stack comprises a thickness of equal to or less than  $50\mu\text{m}$  and further a thickness of equal to or less than  $20\mu\text{m}$ . The anode and cathode layer thicknesses are each less than about half the width between adjacent current collectors which is between about  $1\mu\text{m}$  and  $1500\mu\text{m}$ , and the electrolyte thickness is between  $3\mu\text{m}$  and  $1500\mu\text{m}$ , totaling about  $4\mu\text{m}$  which is less than  $20\mu\text{m}$  and  $50\mu\text{m}$ .

With regard to Claim 6, Mardilovich et al. discloses in Figure 1A, the element of Claim 1 above, further comprising current collectors (20).

With regard to Claims 7-8, Mardilovich et al. discloses in Figures 1A, 1B, a dual chamber fuel cell element (10), comprising: a dual chamber fuel cell stack layer (paragraph 0051) comprising an anode (16), cathode (18) and electrolyte materials (14) deposited on one side of a substrate (70) as can be seen in Figure 8, and wherein one or more separated flow passageways formed between the stack and the substrate through the process of a conductive member (20') covering the substrate (70) being partially or fully removed to form passageways to expose electrodes to oxidants/reactants (paragraph 0094).

With regard to Claims 9-10, Mardilovich et al. discloses in paragraphs 0056-0059, the element of Claim 7 above, wherein the stack comprises a thickness of equal to or less than  $50\mu\text{m}$  and further a thickness of equal to or less than  $20\mu\text{m}$ . The anode and cathode layer thicknesses are each less than about half the width between adjacent current

collectors which is between about  $1\mu\text{m}$  and  $1500\mu\text{m}$ , and the electrolyte thickness is between  $3\mu\text{m}$  and  $1500\mu\text{m}$ , totaling about  $4\mu\text{m}$  which is less than  $20\mu\text{m}$  and  $50\mu\text{m}$ .

With regard to Claim 12, Mardilovich et al. discloses in Figure 9, a dual fuel cell element (10), comprising: a fuel cell stack supported on one side of a substrate (paragraph 0093); and a means for passing a fuel stream and an oxygen containing stream over the fuel cell stack on the same side of the substrate wherein the fuel stream and oxygen stream remain separated when exposed to the stack (paragraph 0094).

With regard to Claims 13-14, Mardilovich et al. discloses in paragraphs 0056-0059, the element of Claim 12 above, wherein the stack comprises a thickness of equal to or less than  $50\mu\text{m}$  and further a thickness of equal to or less than  $20\mu\text{m}$ . The anode and cathode layer thicknesses are each less than about half the width between adjacent current collectors which is between about  $1\mu\text{m}$  and  $1500\mu\text{m}$ , and the electrolyte thickness is between  $3\mu\text{m}$  and  $1500\mu\text{m}$ , totaling about  $4\mu\text{m}$  which is less than  $20\mu\text{m}$  and  $50\mu\text{m}$ .

With regard to Claim 16-19, Mardilovich et al. discloses in Figures 1A, 1B, a fuel cell element (10), comprising: a fuel cell stack layer (paragraph 0051) deposited on one side of a substrate (70) as can be seen in Figure 8, the stack comprising successive layers of an anode (16), cathode (18) and electrolyte materials (14); wherein one or more flow passageways formed between the stack and the substrate through the process of a conductive member (20') covering the substrate (70) being partially or fully removed to form passageways to expose electrodes to oxidants/reactants (paragraph 0094); wherein the stack comprises a thickness of equal to or less than  $50\mu\text{m}$ , and with regard to Claim 19, the stack comprising a thickness of equal to or less than  $20\mu\text{m}$ . The anode and

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cathode layer thicknesses are each less than about half the width between adjacent current collectors which is between about  $1\mu\text{m}$  and  $1500\mu\text{m}$ , and the electrolyte thickness is between  $3\mu\text{m}$  and  $1500\mu\text{m}$ , totaling about  $4\mu\text{m}$  which is less than  $20\mu\text{m}$  and  $50\mu\text{m}$  (paragraphs 0056-0059).

4. Claims 1-2, 6, 7-8, 21, and 25-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Thirukkvalur (US 2005/0048343 A1).

With regard to Claims 1-2, 6 and 7-8, Thirukkvalur discloses in Figures 1 and 9, a dual chamber fuel cell element (paragraph 0010), comprising: a dual chamber fuel cell stack layer (105) comprising anode (116), cathode (108) and electrolyte materials (112) deposited on one side of a current collector layer (104) which is deposited onto a substrate (702) or mandrel (paragraph 0054) which can stay in place and does not need to be removed if it can withstand sintering or if no sintering is required (paragraph 0060). He discloses in paragraph 0051, wherein one or more flow passageways are formed between the stack and the substrate because parts of the current collector (104) are removed from at least some of the surface area of the electrode layer to provide holes so that fuel and/or oxidizer (usually air) can pass through the current collector layers to reach the electrodes.

With regard to Claim 21, Thirukkvalur discloses a fuel cell comprising: one or more fuel cell elements (105); and a fuel cell housing or chamber (102); wherein the fuel cell elements a supported fuel cell stack having integrated flow passageways between the fuel cell stack and the support (paragraph 0054) due to etching of holes into current collectors (104).

With regard to Claim 25, Thirukkvalur discloses in paragraph 0062, wherein the fuel cell elements (105) are aligned within the fuel cell chamber to allow the flow of a first gas stream within the flow passageways and a second gas stream over the fuel cell stack.

With regard to Claims 26-29, Thirukkvalur discloses in paragraphs 0010-1011 and 0027, the first gas stream comprising a fuel and the second stream comprising an oxygen containing gas and/or the first stream comprising an oxygen containing gas and the second stream comprising a fuel because depending on the way the electrode layers are deposited a cathode could be subjected to the first stream and the anode to the second stream or vice-versa.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 5, 11, 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mardilovich et al. (US 2004/0081878 A1) as applied to Claims 1-4, 6-10, 12-14 and 16-19 above.

Mardilovich et al. discloses the fuel cell element in paragraph 3 above, but does not disclose the element wherein the stack comprises a thickness of equal to or less than 1 $\mu$ m. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a stack with a thickness equal to or less than 1 $\mu$ m, since it has

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been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

7. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thirukkvalur (US 2005/0048343 A1), as applied to Claims 1, 2, 6, 7-8, 21 and 25-29 above, and in further view of Mardilovich et al. (US 2004/0081878 A1).

Thirukkvalur discloses the fuel cell element as described in paragraph 4 above, but does not disclose the fuel cell stack comprising a thickness of equal to or less than 50 $\mu$ m and further comprising a thickness of equal to or less than 20 $\mu$ m.

With regard to Claims 22-23, Mardilovich et al. discloses in paragraphs 0056-0059, a fuel cell stack comprises a thickness of equal to or less than 50 $\mu$ m and further a thickness of equal to or less than 20 $\mu$ m. The anode and cathode layer thicknesses are each less than about half the width between adjacent current collectors which is between about 1 $\mu$ m and 1500 $\mu$ m, and the electrolyte thickness is between 3 $\mu$ m and 1500 $\mu$ m, totaling about 4 $\mu$ m which is less than 20 $\mu$ m and 50 $\mu$ m. Therefore, it would have been obvious to a person of ordinary skill in the art to use a stack with a thickness of equal to or less than 50 $\mu$ m and further equal to or less than 20 $\mu$ m to the fuel cell of Thirukkvalur, because the Mardilovich et al. reference teaches current collectors/conductive members being embedded in the stack and used as a sacrificial layers to be removed and create flow passageways, in which a certain thickness must be present in order to form passageways.



With regard to Claim 24, Thirukkvalur discloses the fuel cell element as described in paragraph 4 above, but does not disclose the fuel cell stack comprising a thickness of equal to or less than  $1\mu\text{m}$ . Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a stack with a thickness equal to or less than  $1\mu\text{m}$ , since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Karie O'Neill  
Examiner  
Art Unit 1745

KAO



**DAH-WEI YUAN**  
**PRIMARY EXAMINER**